NANTICOKE ENVIRONMENTAL COMMITTEE

1985 AIR QUALITY DATA SUMMARY

September, 1986

Ministry of the Environment
Ontario

B.I. BOYKO, Director
West Central Region

NANTICOKE ENVIRONMENTAL COMMITTEE

1985 AIR QUALITY DATA SUMMARY

Ministry of the Environment
Air Quality Assessment
Technical Support Section
West Central Region
September, 1986

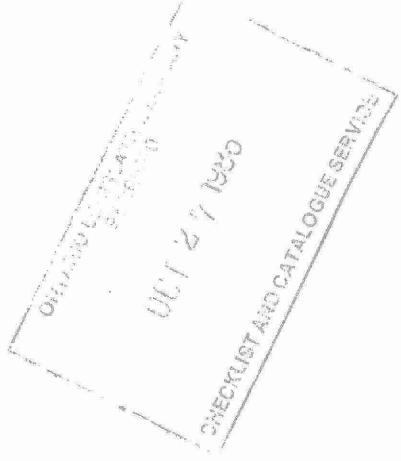


TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

The Nanticoke Environmental Management Program (NEMP) was formed in 1978 to co-ordinate a study into the impact of industrial development on air quality in the area surrounding Nanticoke. NEMP was sponsored jointly by the Federal and Ontario Governments, Ontario Hydro, Stelco and Texaco. Beginning in 1984, the Ministry's West Central Region assumed responsibility for network operations from Air Resources Branch. At that time, the monitoring network was reduced and restructured because the accumulation of data revealed that air quality was good and that the previously intensive monitoring in outlying areas was not warranted. A private contractor funded by Texaco and Stelco provides one technician to maintain the network. In mid-1985, NEMP and a similar group concerned with water quality were amalgamated into one organization called the Nanticoke Environmental Committee. All activities are now undertaken under NEC.

The purpose of the monitoring program is to determine compliance with provincial air quality criteria and also to measure the impact of the industrial development on the local air quality. Contaminants which may enter the area from outside sources are also identified.

The three main industries which have located in Nanticoke are Ontario Hydro's Thermal Generating Station, Texaco's oil refinery and Stelco's basic steel plant. A few smaller industries have located in the area as well.

NEC has undertaken to measure the ambient air concentrations of those compounds or substances that are regulated under the Provincial and Federal Environmental Protection Acts, and that could be a result of the Nanticoke industries' activities. The Ontario Ministry of the Environment's air quality criteria are set for the protection of human health and well being as well as to protect vegetation, animal life and property.

MONITORING NETWORK

Monitoring stations have been located to take into account predominant wind patterns and source location as well as to differentiate to the degree possible between industrial and other contributions.

A map of the 1985 network is shown in Figure 1, and the pollutants measured at each location are given in Table 1. Wind data (speed and direction) were measured at both Long Point and near Jarvis. The latter station's wind data were utilized in a computer program known as a "pollution rose" which is essentially a cross-tabulation of average hourly pollutant concentrations with wind direction. The pollution roses for individual stations are illustrated graphically on several maps in the report. For each "rose" presented, the length of individual lines drawn is proportional to the average concentration when the wind was blowing from that direction. The data from this program are a useful tool in identifying sources of pollutants.

In addition to the NEMP monitoring network, Ontario Hydro has operated its own network of sulphur dioxide analyzers since 1970. Some of these data are referred to in this report.

ANALYSIS OF DATA

Sulphur Dioxide

Sulphur dioxide (SO_2) was measured continuously at five sites within the NEC network and at eight Ontario Hydro stations in 1985. All of the stations easily met the annual and daily air quality objectives of .02 and .10 ppm respectively. Data from the Ministry monitors are given in Table 2. Out of a total of over 100,000 hours of monitoring, the 1-hour objective of .25 ppm was exceeded only twice by a pair of Ontario Hydro monitors. The two elevated readings occurred near Balmoral and Decewsville, and were likely caused by short term fumigations resulting from the Generating Station's plume. Several other similar fumigation incidents were observed at other stations, but these did not exceed the hourly objective.

Pollution roses for SO_2 in Figure 2 for the five Ministry monitors generally show a minor long-term impact from the Nanticoke industries (with the exception of Long Point) as highest averages were generally related to winds from the industrial area. These averages, however, were quite low. The Long Point station showed very low levels with no direction dominating.

Figure 7 illustrates the historical trend of sulphur dioxide annual average concentrations for eight SO_2 monitors which have operated continuously since 1976. Concentrations can be seen to be very uniform over this ten year period with no deterioration in concentrations. Similarly in Figure 8, the number of hourly exceedences per year at these eight stations is shown. Only random fluctuation is apparent.

Total Reduced Sulphur

Total Reduced Sulphur (TRS) is monitored at three locations - Nanticoke Village, South Walpole School on Sandusk Rd. and on Cheapside Rd. just south of Highway 3. There are no general criteria for TRS but there is an hourly objective for hydrogen sulphide (H_2S), the "rotten egg" gas, of 20 ppb, which is based on its odour threshold. The monitor measures H_2S, and many other sulphur compounds.

Sources of these pollutants include slag quenching activities at Stelco and fuel oil storage tanks and a sulphur recovery operation at Texaco. Apart from industrial sources, sulphur compounds can be liberated from groundwaters that have been contaminated by natural seepages or from leaking natural gas wells, known to exist in the area. Stelco emissions have been shown to consist primarily of H_2S and thus, comparison of TRS data to the H_2S objective, particularly within Nanticoke Village when downwind of Stelco, is reasonable. Texaco emissions have been less well characterized but are not believed to consist primarily of H_2S. Other organic sulphur compounds are probably present in their emissions and consequently levels downwind of Texaco cannot be rightfully compared to the H_2S standard. The TRS data are summarized in Table 3.

In 1985, a moderate improvement in TRS levels from 1984 occurred at the school and Cheapside stations. Nanticoke Village was unchanged from 1984 and showed the highest levels. The improvement at the former two stations is illustrated in Figure 9, the trends in yearly average, and also in Figure 10, the trend in the number of hours exceeding an arbitrary flag concentration of 8 ppb. Many TRS compounds can be smelled at about 8 ppb, but both stations recorded less than 10 hours each above this concentration. The hourly H_2S objective (20 ppb) was exceeded

twice at the Cheapside station during consecutive hours on November 10. Since the school site, close to Texaco remained low and wind direction data were inconclusive, the cause of these readings is unknown.

As mentioned, levels recorded in Nanticoke Village close to Stelco were much higher on average. The flag concentration of 8 ppb was exceeded during 129 hours here and the hourly H_2S objective (20 ppb) was exceeded during 17 hours during the year.

The school and Cheapside sites are mainly affected by Texaco, whose overall effect on TRS levels would appear to be minor. This is apparent in the pollution rose diagrams shown in Figure 3. Conversely, the rose for Nanticoke Village shows a much stronger impact on TRS from Stelco.

Yearly trends in TRS dating back to 1979 are given in Figures 9 and 10. A deterioration in Nanticoke Village is plainly evident in 1983-85. Discussions with Stelco have been undertaken in order to determine the sources of their TRS emissions with an aim towards reducing this problem.

It should be noted that although the H_2S objective is only occasionally exceeded, valid odour problems can at times occur in Nanticoke Village. The difficulty in comparing odours to measured hourly averaged levels arises in the instantaneous detection of odorous sulphur compounds by the human nose. Odours can be of such a short term nature, that an elevated hourly average does not occur. Thus, the hourly H_2S objective is currently being reviewed to take this factor into account.

Oxides of Nitrogen

Oxides of nitrogen result from high temperature combustion sources including the automobile. The most abundant oxides are nitric

oxide (NO) which is largely a direct emission of fuel burning and nitrogen dioxide (NO_2) which is mostly an oxidation product once the contaminant is airborne. Objectives exist only for nitrogen dioxide and are based on odour threshold levels (hourly-.2 ppm) and health effects (24-hour - .1 ppm). Other adverse effects occurring at higher levels include vegetation damage, reduced visibility and corrosion of metals.

Data for NO_2 and NO for three stations are summarized in Tables 4 and 5. Levels in 1985 continued to be very low and well within objectives. There have never been any NO_2 exceedences measured.

The pollution roses for NO_2 in Figure 4 indicate little contribution from the Nanticoke industries. Road traffic is likely a greater factor than industrial emissions. The higher average levels measured at the Simcoe site are probably due to the instrument in use which is an older model. It has more technical problems which interject a slight positive bias to the yearly average. The "improvement" from 1984 at Simcoe may be related to a lessening in this bias, particularly since a newer model instrument was used from January to April while the regular instrument was being repaired.

Yearly trends of NO_2 for the three stations are given in Figure 11. In the past few years a trend to decreasing concentrations is apparent.

Hydrocarbons

Ambient hydrocarbons can come from vehicular traffic, seepages at natural gas wells, natural by-products of vegetation, the commercial processing and transportation of refined petroleum products (Texaco) and coking operations (Stelco).

The instrument utilized measures a large spectrum of individual compounds with varying adverse impacts. Since the mixture of compounds will vary from place to place, it has not been possible to apply a guideline or objective for this parameter.

The instrument separates the hydrocarbons into two fractions- methane and non-methane. The latter are referred to as "reactive" hydrocarbons (RHC). Data for reactive hydrocarbons for three stations are given in Table 6 and data for methane for two stations are given in Table 7.

In 1985, concentrations of reactive hydrocarbons decreased at the school and Cheapside sites (similar to TRS) but remained relatively unchanged at Simcoe. The pollution roses in Figure 5 show a minor impact from Texaco at the school site but further downwind at Cheapside this impact was not as evident. Significantly higher levels were measured at Simcoe, but the rose shows uniform concentrations from all directions. The higher levels may either be due to technical problems or less likely, due to some local sources such as vehicle emissions.

Concentrations of methane at the school and Cheapside were similar to each other and probably reflected background levels.

Yearly trends are given in Figures 12 and 13 and indicate stable levels of methane dating back to 1980. The decreasing trend of reactive hydrocarbons should be overlooked since data prior to 1984 are believed to be in error due to instrumentation problems. As with methane, RHC levels have probably remained stable.

In order to measure hydrocarbon levels near Stelco, the Cheapside monitor was moved to Nanticoke Village in 1986.

Ozone

Oxidants are products of photochemical reactions involving oxides of nitrogen, hydrocarbons and sunlight. Ozone (O_3) accounts for most of the oxidants produced and the sources of the precursor pollutants are mainly industrial and automotive. Ozone is injurious to different types of vegetation including tobacco and tomato crops. The 1-hour objective for ozone (.08 ppm) is based on vegetation effects, but ozone can have adverse human health effects at higher levels.

Ozone concentrations follow very definite annual and daily trends. Highest levels occur during the summer (May to September), and the daily maxima usually occur during mid-afternoon. Both patterns are directly related to temperature and the amount and intensity of sunlight.

Ozone concentrations were measured at two sites in 1985 and data are summarized in Table 8. In 1985, concentrations were similar to previous years but more exceedences of the hourly objective occurred at Long Point. There were 183 exceedences observed at Long Point and 71 at Simcoe. Elevated levels at the two stations generally occurred concurrently during the summer with slightly higher concentrations measured at Long Point and usually during southerly winds indicating that the high concentrations were imported from the United States. There were 36 separate days during the summer in which one or both stations exceeded the hourly objective. Although Simcoe recorded far fewer hourly exceedences, it is important to note that the instrument was out of service for extended periods of time in the critical growing months of August and September.

The pollution roses in Figure 6 confirm that the highest averages occurred under winds from the south and southeast although the relative magnitudes were not that much greater than for other

directions. Elevated concentrations do not automatically occur with southerly winds, even during the summer. Specific meteorological conditions are necessary.

The yearly trend graph of hourly exceedences at the two stations in Figure 14 indicates random fluctuations which are probably related to climatological variation.

Ozone, hydrocarbons and oxides of nitrogen can be transported over great distances and can be augmented by local sources. It is generally believed that the ozone problem in Southern Ontario is due to long range transport from the United States and thus will have to be resolved on a regional rather than local scale.

Total Suspended Particulates

Total suspended particulates (TSP) are measured with high volume samplers which draw a known volume of air through a pre-weighed filter for a 24 hour period (midnight to midnight). The exposed filter is weighed, and the difference (weight of solids on filter) in conjunction with the known air volume sampled is used to calculate a TSP concentration in micrograms per cubic metre. The objective for a 24 hour average is 120 ug/m^3 while the yearly geometric mean objective is 60 ug/m^3. The samplers operate once every six days.

TSP was measured at 14 hi-vol sites in 1985, and all stations met the yearly objective as given in Table 9. Concentrations were highest within Nanticoke Village, only slightly below the yearly objective. Most stations measured from zero to two exceedences of the daily objective. Many of these were due to farming activities and most locations recorded an exceedence on May 31 when a severe windstorm created elevated particulte levels throughout the Region. The hi-vol in Nanticoke Village measured 6 exceedences of

the daily objective out of 60 samples, mostly on days of stronger southwest winds. This would indicate that fugitive emissions (from roadways, storage piles, etc.) from Stelco were the likely source.

Following complaints of fallout from Ontario Hydro's flyash lagoon area, a hi-vol was established a short distance downwind on Rainham Road. Out of 60 samples, only 2 exceeded the daily objective. However, both occurred on strong southwest wind days indicating that the flyash piles can be a problem on occasion. Monitoring at this location will continue in the future. The Ministry has issued a Control Order to Ontario Hydro designed to reduce emissions of flyash from the ash lagoon area. In 1985, steps were taken to reduce these emissions and additional action will continue in 1986.

A total of seven hi-vol stations have been operating continuously since 1979, and the combined yearly trend of these stations is shown in Figure 15. No deterioration is evident. However, levels within Nanticoke Village, close to Stelco operations and near Hydro's flyash piles, remain a local concern and trends will be carefully monitored.

In 1986, six of the hi-vol stations were terminated, all in outlying areas removed from the industries. Of the eight remaining, most lie close to the industries, but the Port Dover and Jarvis stations remain to measure urban and general background concentrations.

Dustfall

Dustfall is that material which settles out of the atmosphere by gravity. It is collected in plastic containers during a 30 day exposure time. The collected material is weighed and expressed as a deposition rate of grams/m^2/30 days. The measurement is

imprecise and effects are restricted to relatively local areas. Dustfall objectives are based on nuisance effects and are 7.0 grams/m^2/30 days (monthly) and 4.5 grams/m^2/30 days (yearly average). Since dustfall is comprised solely of large particles, it is not a health related parameter.

Dustfall was measured within Nanticoke Village in 1985, and data are given in Table 10. As in previous years, concentrations were very low and below the monthly objective.

The annual trend at this station since 1975 is given in Figure 16. No deterioration is evident with the exception of 1984 which was due entirely to one elevated reading. In 1985, the average was lower than 1984, but marginally higher than years prior. The yearly objective has never been exceeded.

Two dustfall jars were also located near the Ontario Hydro flyash piles along with the hi-vol previously mentioned. Out of 16 samples, one exceeded the monthly objective, that in December at Station 22093, immediately adjacent to the ash lagoon area. Although total dustfall levels were mostly low at the two stations, flyash was detected by microscopic analysis in most of the samples. The one elevated reading at 22093 contained 20% flyash and 40% coal dust, likely from Ontario Hydro's coal piles.

It should be noted that although the air quality particulate objectives were met in 1985, valid complaints concerning short term soiling episodes did occur and were properly addressed and investigated. Such investigations are continuing in 1986.

As noted previously, a Control Order was issued to Ontario Hydro to reduce windblown flyash emissions, which have caused fallout onto neighbouring properties.

Fluoridation

This measurement is a relatively crude assessment used to determine quantities of fluoride compounds in the ambient air. A lime coated paper is exposed to the atmosphere for approximately 30 days and chemically analyzed for fluoride. The fluoride objectives are based on vegetation damage and for this reason, the objective is more stringent during the growing season. For the period April 15 to October 15, it is 40 micrograms/100 cm^2/30 days while for the remainder of the year it is 80. A possible source of this contaminant is Stelco's basic oxygen furnace, although gas scrubbing removes most of the emissions.

Fluoridation was measured at nine locations in the Nanticoke area and 1985 data are given in Table 11. Concentrations in 1985 remained very low and well within the objectives with little variation from site to site, including the stations closest to Stelco.

The combined annual trend of these stations dating back to 1975 is shown in Figure 17 and indicates little change in levels. Due to the low levels measured, the fluoride network was reduced to four stations in 1986, all in the vicinity of Stelco. Should any deterioration occur at these stations, additional monitors could be re-opened.

SUMMARY

Overall, 1985 data in the Nanticoke area revealed that air quality is very good and reflected a relatively minor impact by the main industries. Nuisance type problems related to odours near Stelco and dust fallout near Ontario Hydro are the main items of concern.

Pollutants such as oxides of nitrogen, hydrocarbons and fluoridation rates showed quite low levels well within relevant objectives.

Total reduced sulphur (TRS) and sulphur dioxide (SO_2) normally showed zero or near zero concentrations. However, both showed several hours above objectives. As mentioned, TRS levels and possible odour problems particularly within Nanticoke Village are of concern. The effect of the Nanticoke Generating Station on SO_2 levels would appear to be minor. Only 2 hours of over 100,000 hours of monitoring exceeded the hourly objective.

Particulate levels in the Region were also quite low and generally showed acceptable concentrations. However, as with TRS, Nanticoke Village particulate levels remain a concern. Fugitive dust emissions from the Stelco mill site can be a problem, particularly under high wind conditions. The same holds true for the Ontario Hydro flyash lagoon area. A Control Order has been issued to Ontario Hydro to reduce windblown emissions of flyash from the ash lagoon area. Efforts are also being made to reduce Stelco's emissions.

Another pollutant of concern is ozone, a product of long range transport. Elevated concentrations above objectives continued to be observed in 1985 and appeared to arrive mostly from the United States during the summer. Oxidant control will be required on a regional rather than local scale.

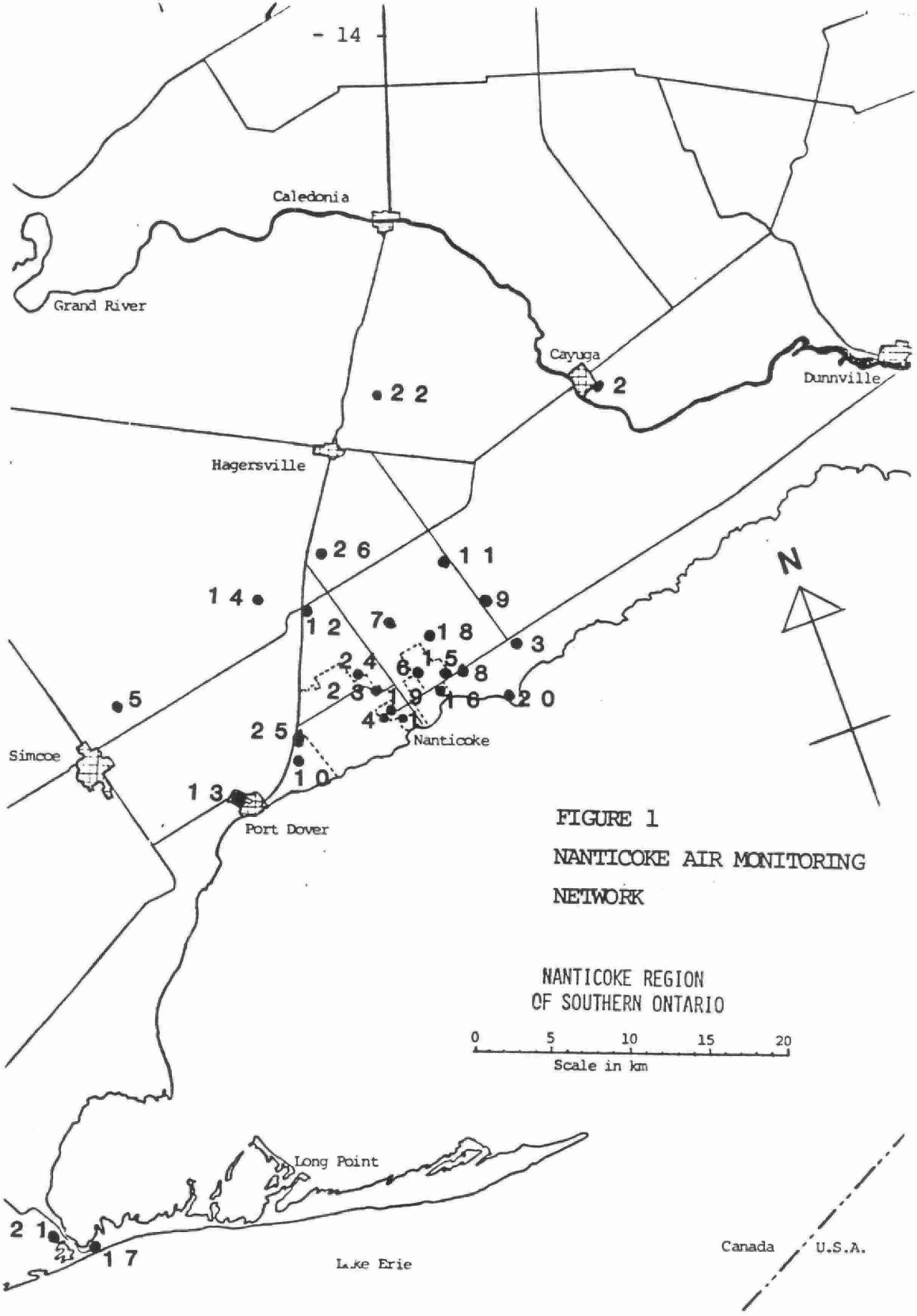


FIGURE 1

NANTICOKE AIR MONITORING NETWORK

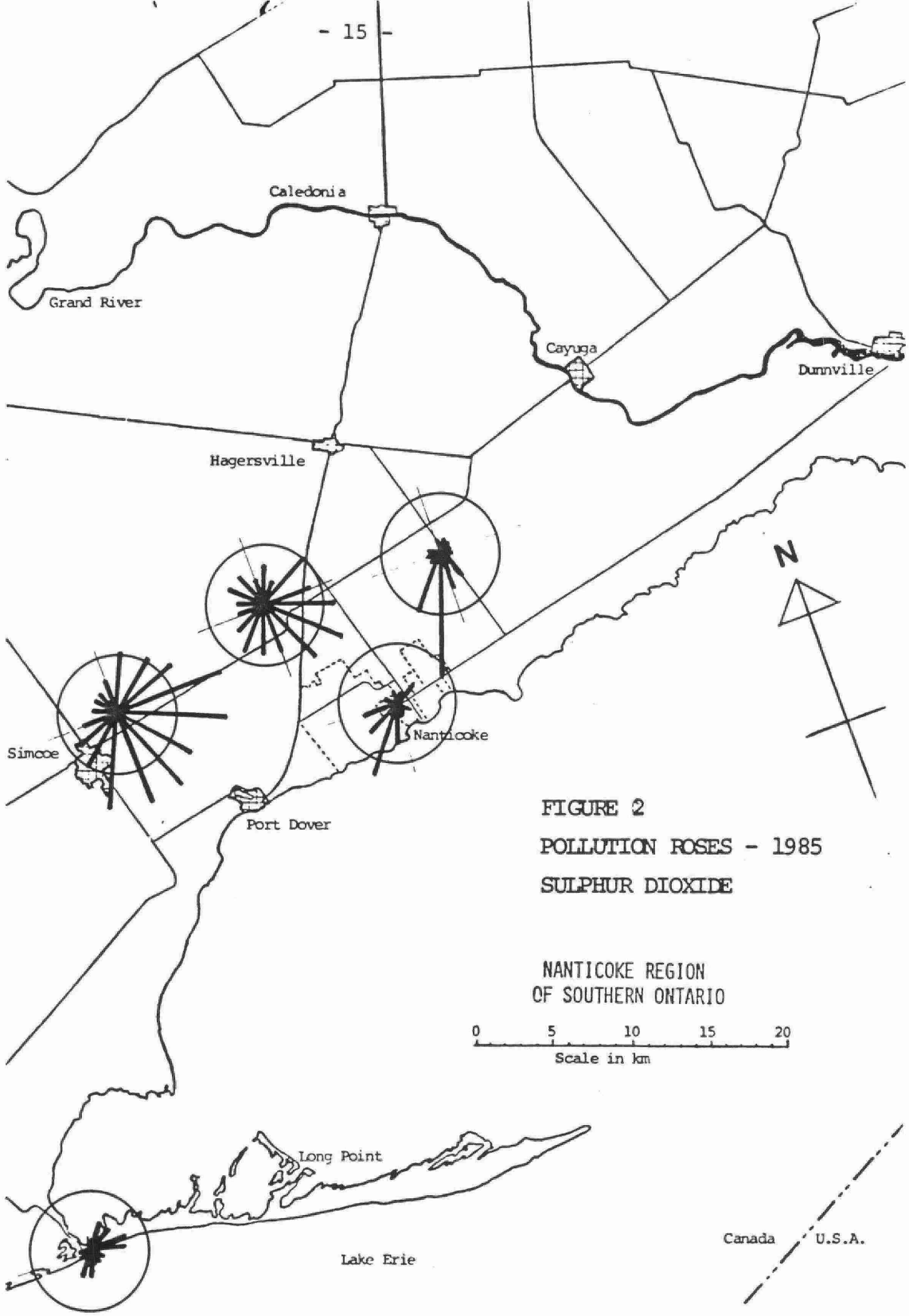


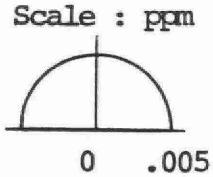
FIGURE 2

POLLUTION ROSES - 1985

SULPHUR DIOXIDE

NANTICOKE REGION
OF SOUTHERN ONTARIO

Scale : ppm



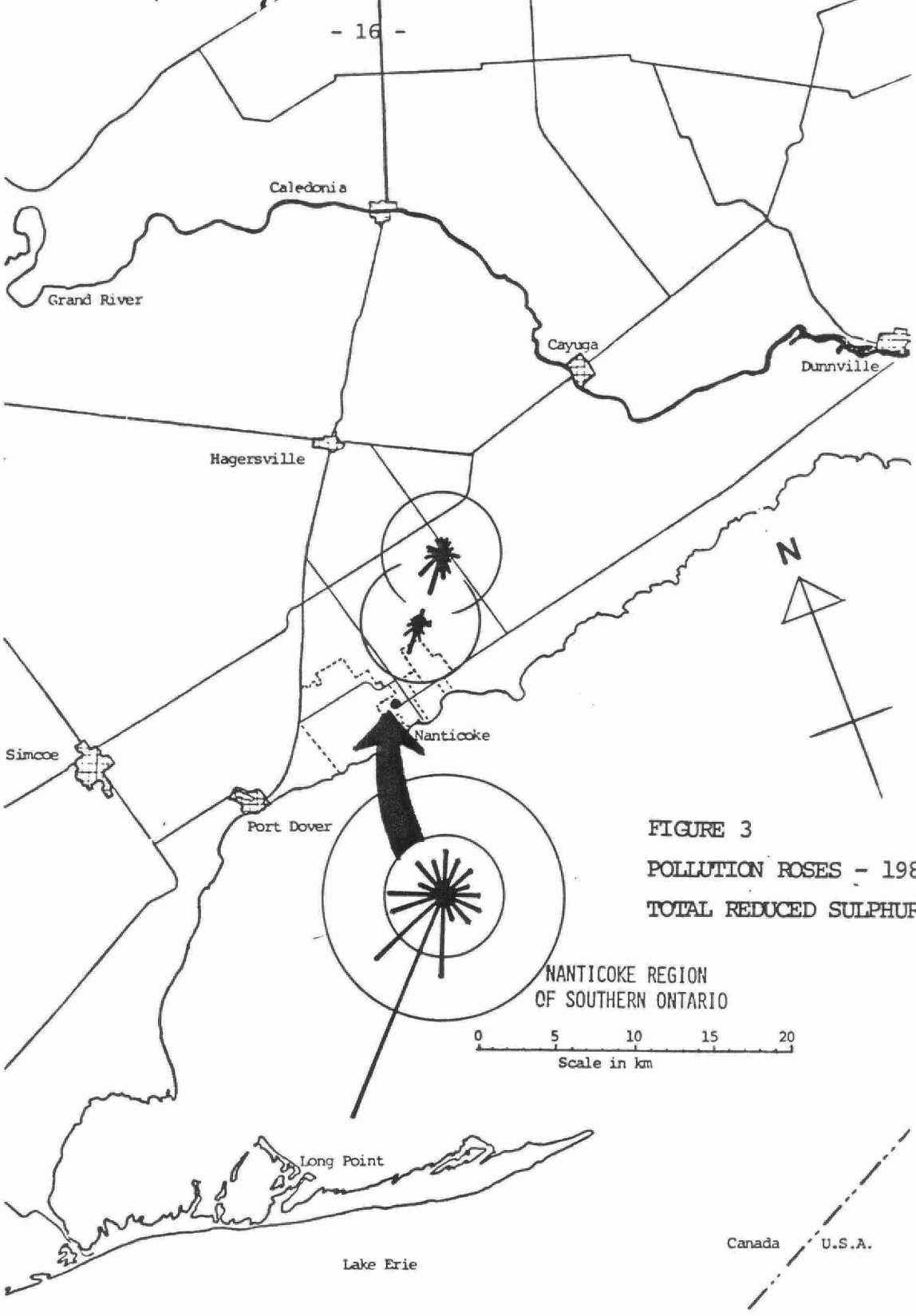
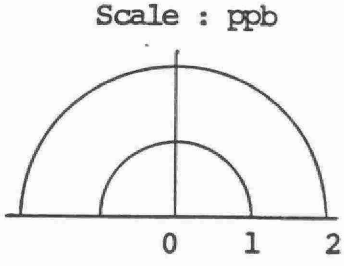


FIGURE 3

POLLUTION ROSES - 1985

TOTAL REDUCED SULPHUR



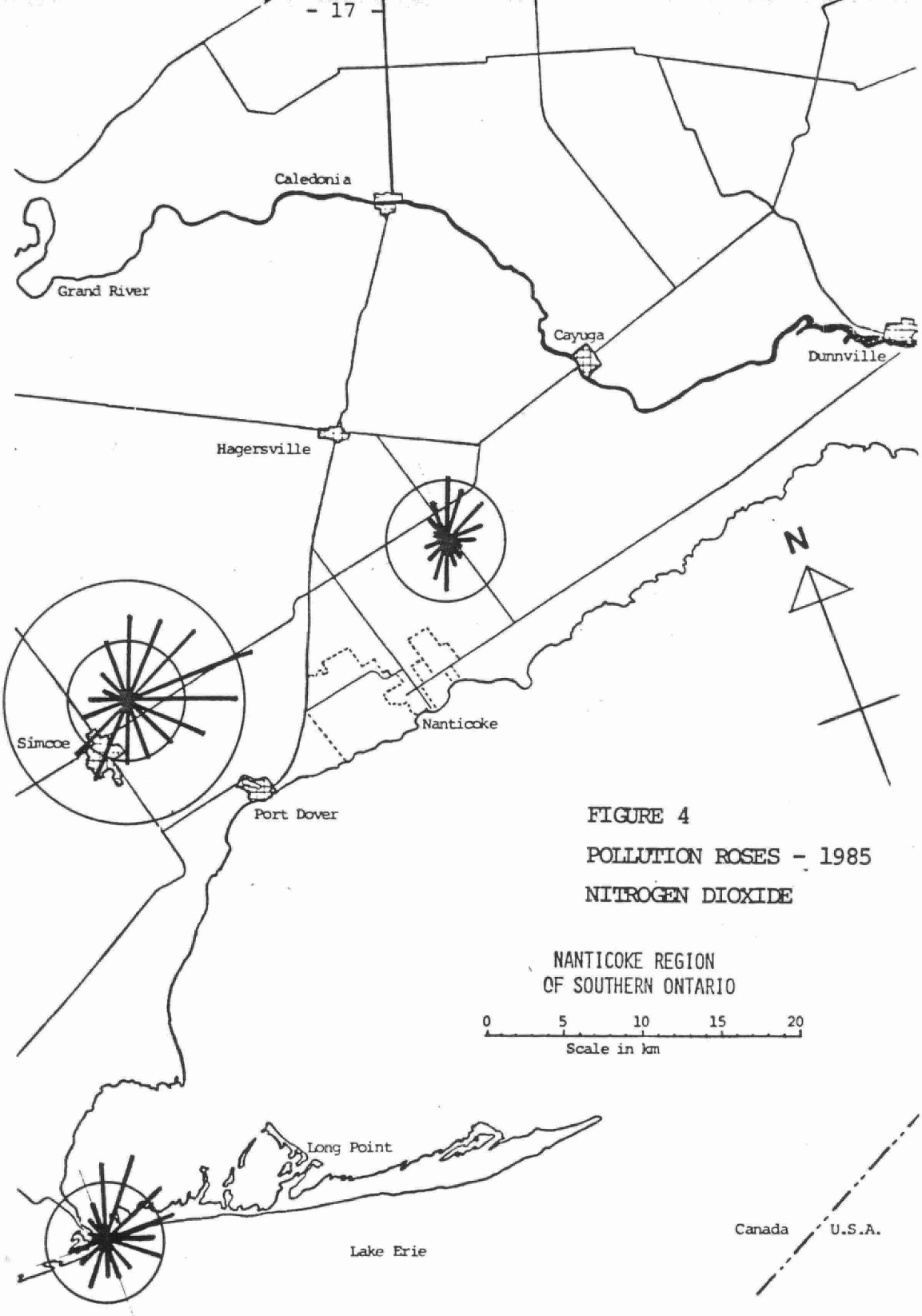
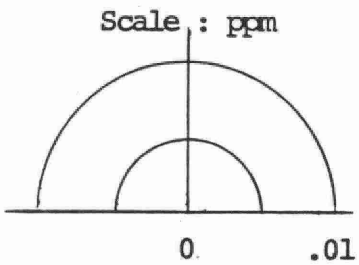


FIGURE 4

POLLUTION ROSES - 1985

NITROGEN DIOXIDE



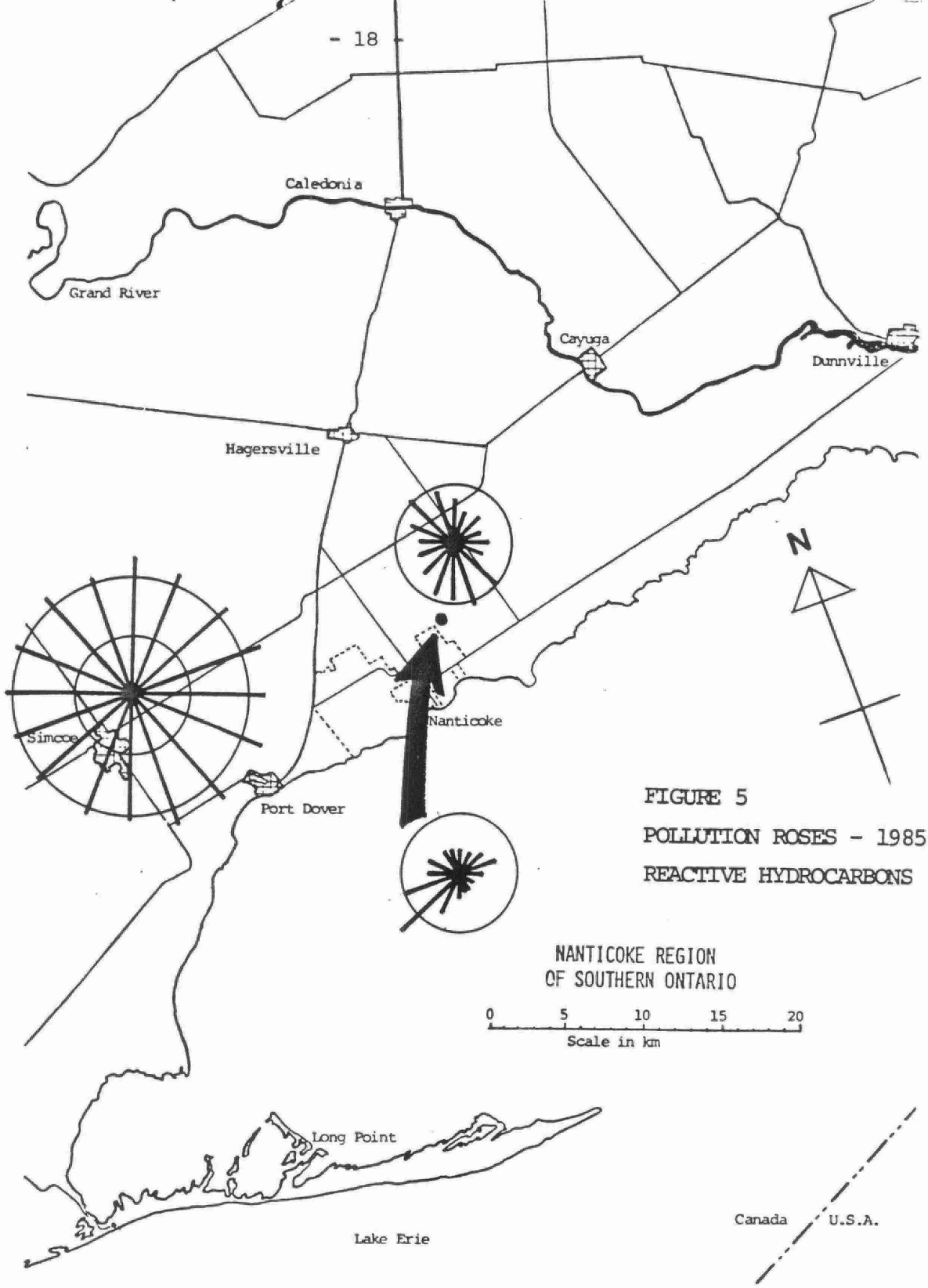
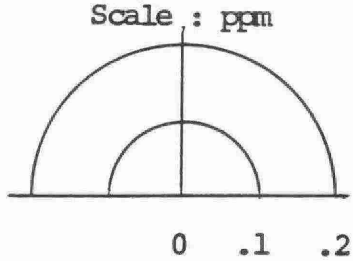


FIGURE 5

POLLUTION ROSES - 1985

REACTIVE HYDROCARBONS



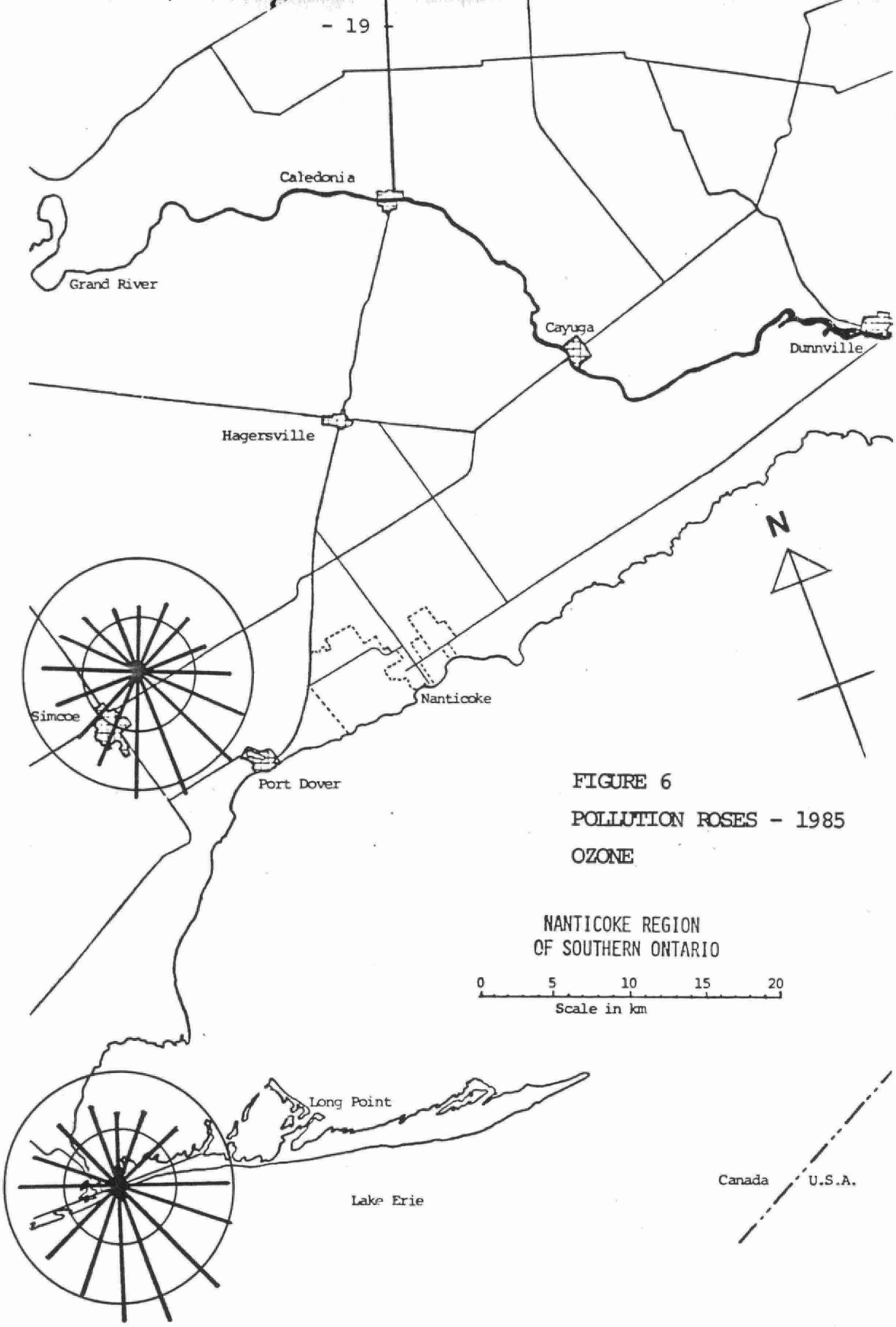


FIGURE 6

POLLUTION ROSES - 1985

OZONE

Scale : ppb

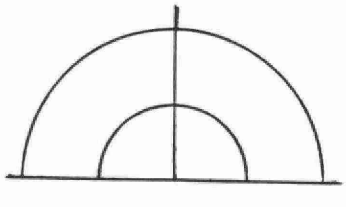
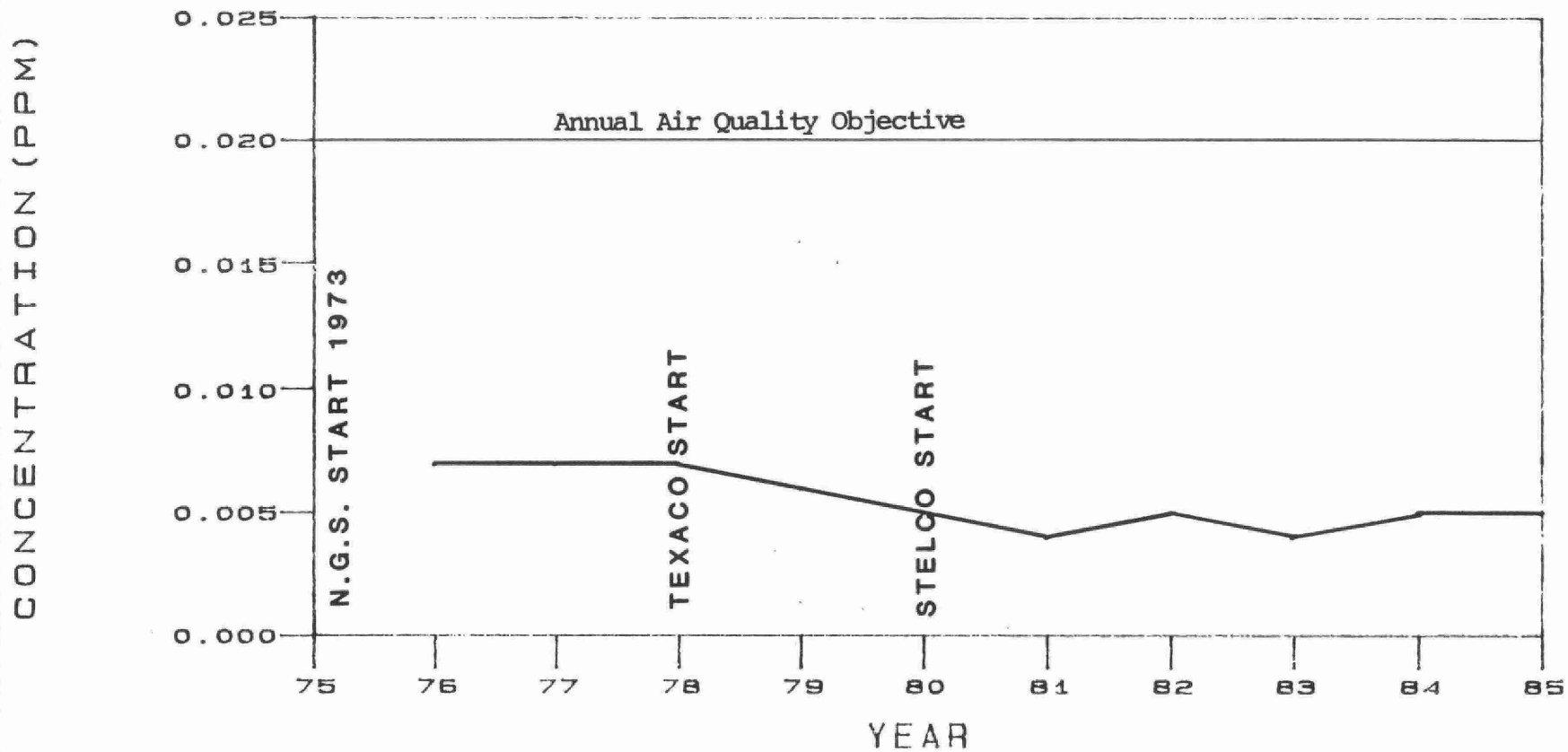


FIGURE 7

SULPHUR DIOXIDE YEARLY TREND

NANTICOKE



AVERAGE OF 8 STATIONS

FIGURE 8

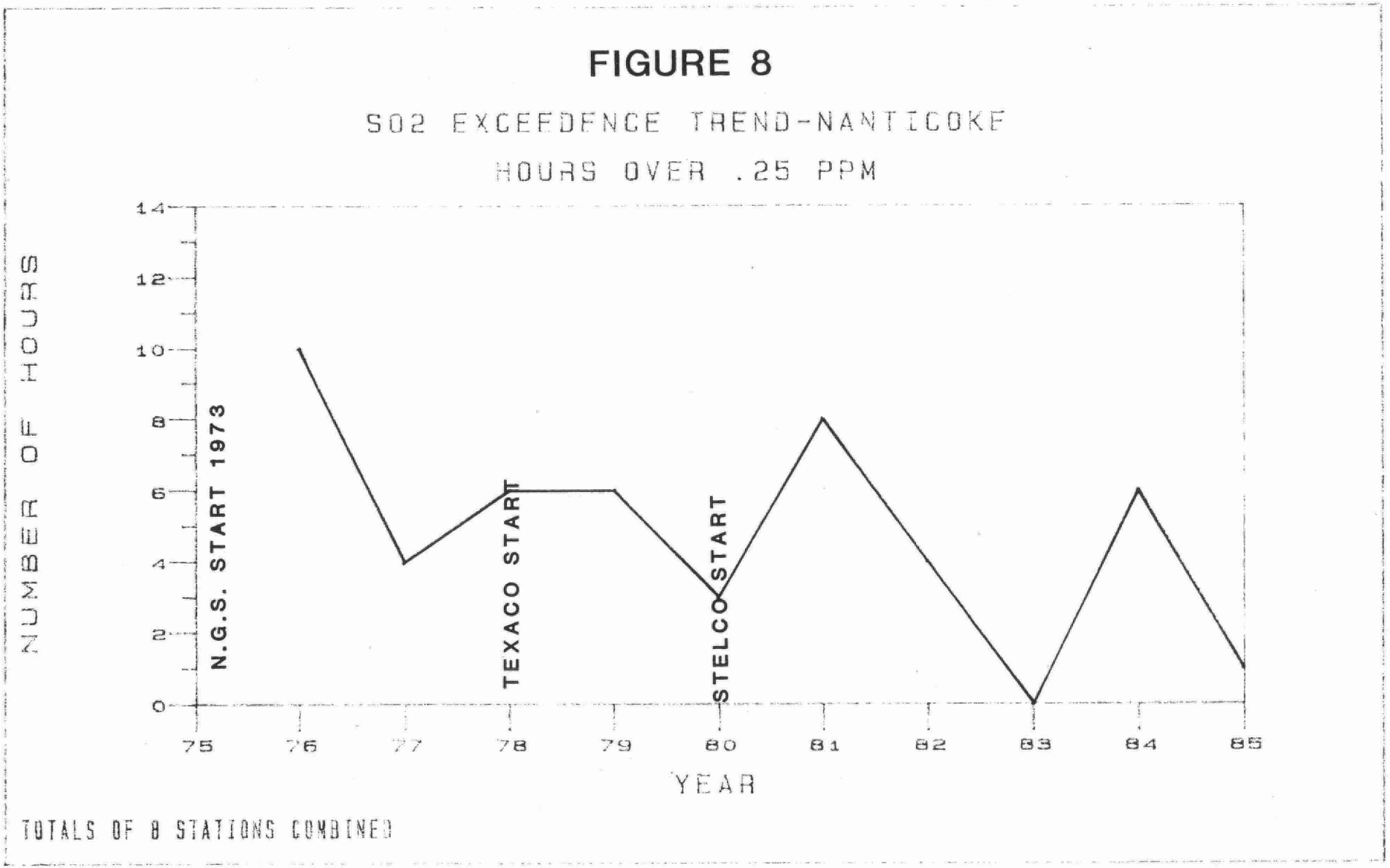

SO2 EXCEEDENCE TREND-NANTICOKE
HOURS OVER .25 PPM
NUMBER OF HOURS
0
2
4
6
8
10
12
14
N.G.S. START 1973
TEXACO START
STELCO START
75
76
77
78
79
80
81
82
83
84
85
YEAR
TOTALS OF 8 STATIONS COMBINED

FIGURE 9

TOTAL REDUCED SULPHUR YEARLY TRENDS

NANTICOKE

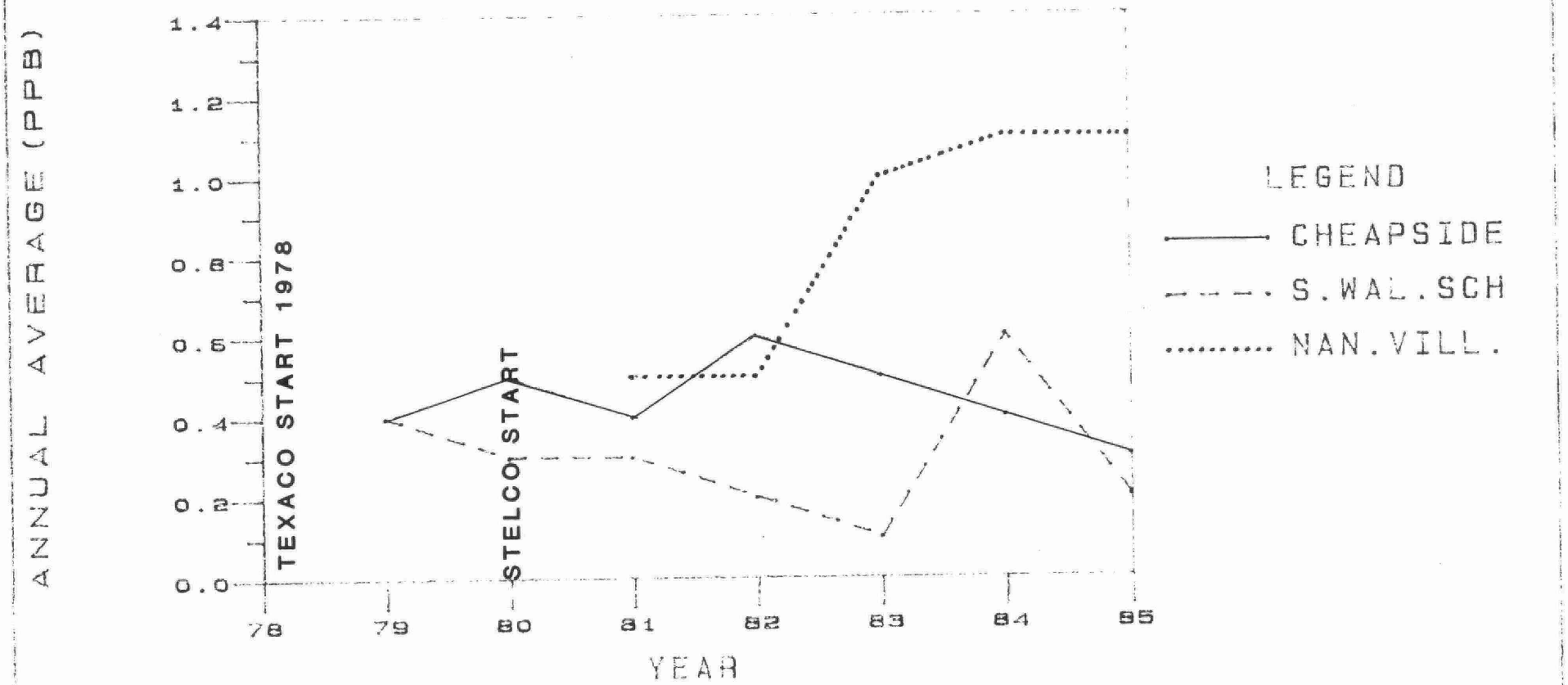


FIGURE 10

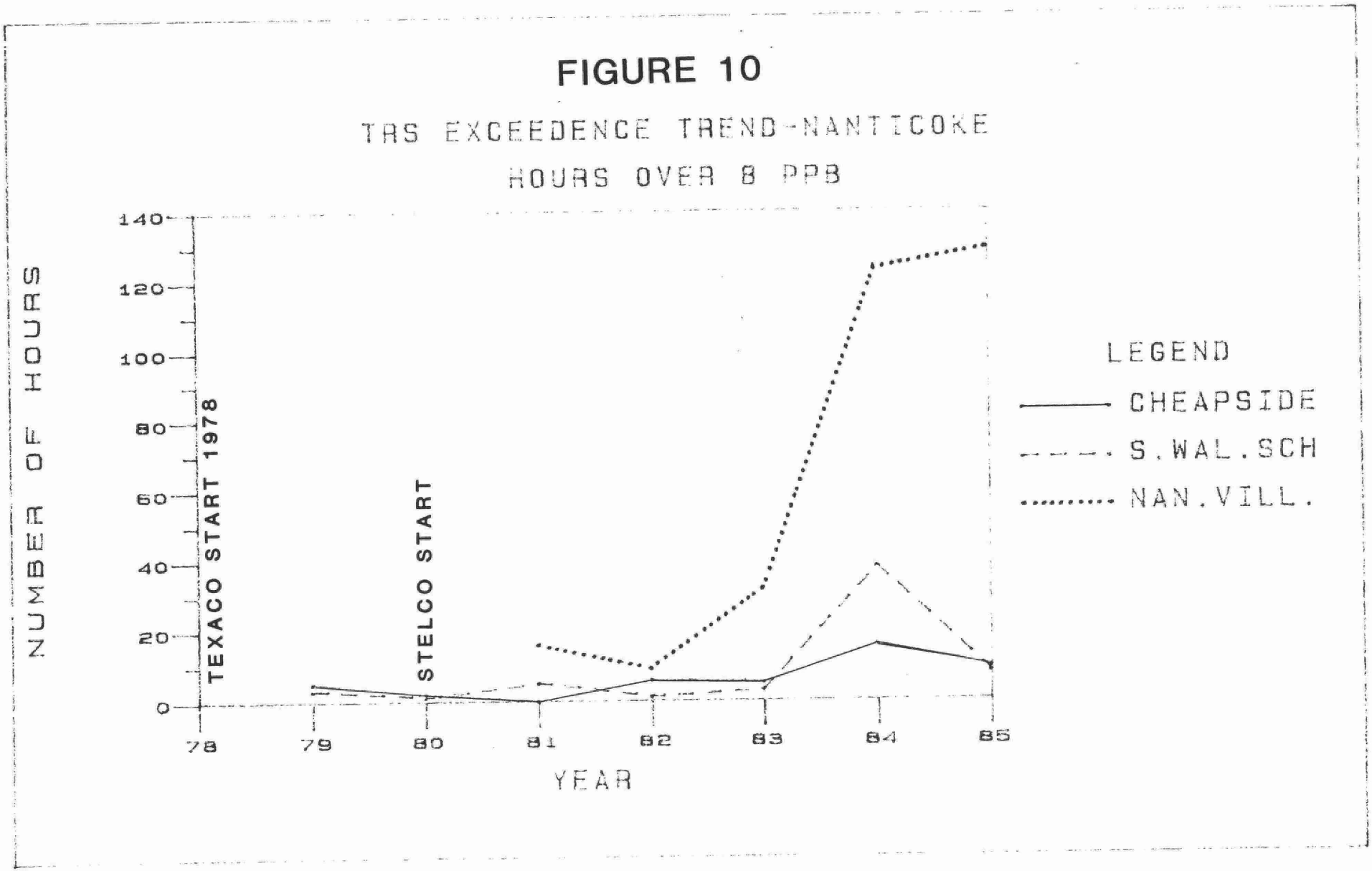

TRS EXCEEDENCE TREND-NANTICOKE
HOURS OVER 8 PPB
NUMBER OF HOURS
140
120
100
80
60
40
20
0
TEXACO START 1978
STELCO START
78
79
80
81
82
83
84
85
YEAR
LEGEND
CHEAPSIDE
S.WAL.SCH
NAN.VILL.

FIGURE 11

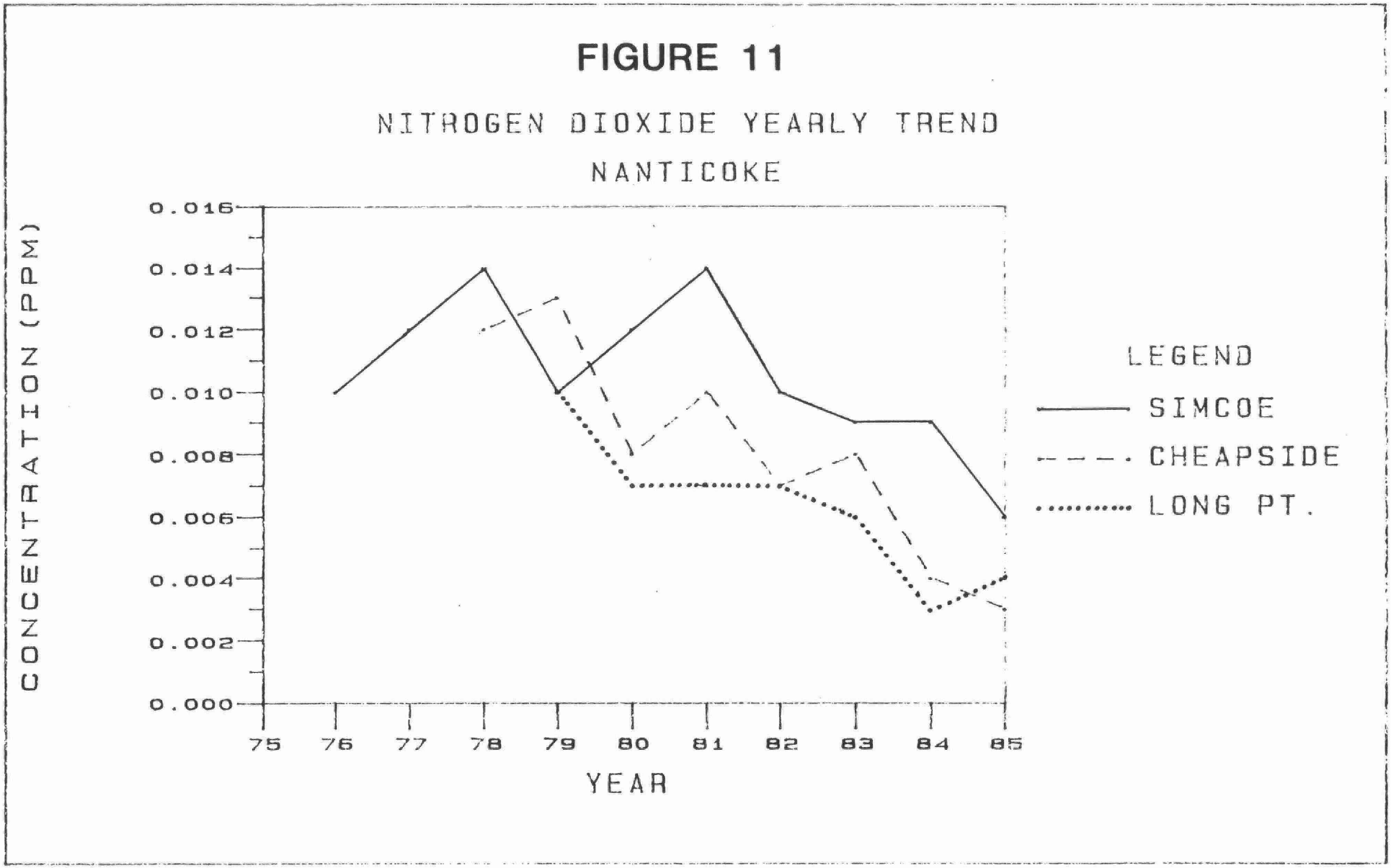

NITROGEN DIOXIDE YEARLY TREND
NANTICOKE
CONCENTRATION (PPM)
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
75
76
77
78
79
80
81
82
83
84
85
YEAR
LEGEND
SIMCOE
CHEAPSIDE
LONG PT.

FIGURE 12

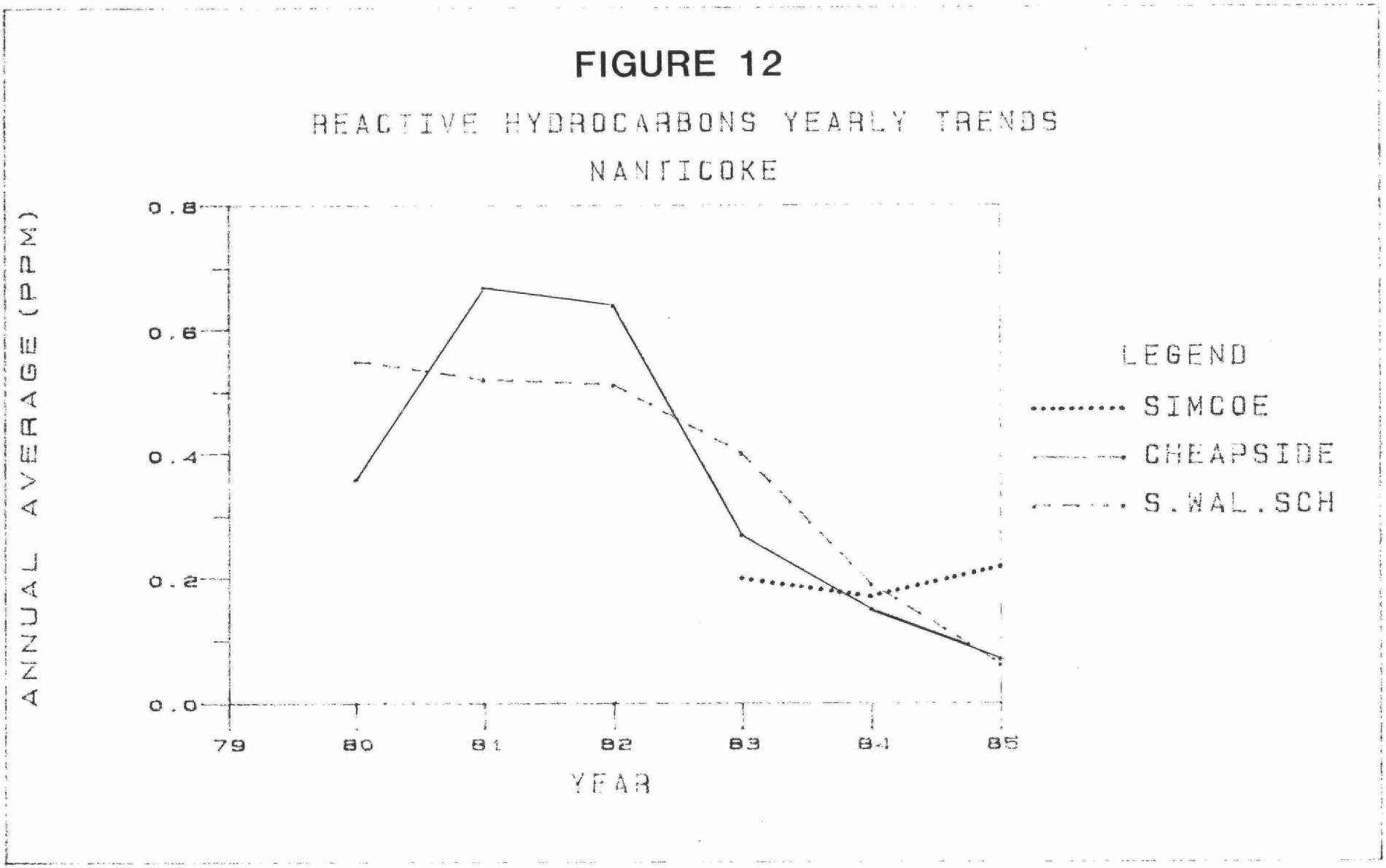

REACTIVE HYDROCARBONS YEARLY TRENDS
NANTICOKE
ANNUAL AVERAGE (PPM)
0.8
0.6
0.4
0.2
0.0
79
80
81
82
83
84
85
YEAR
LEGEND
SIMCOE
CHEAPSIDE
S.HAL.SCH

FIGURE 13

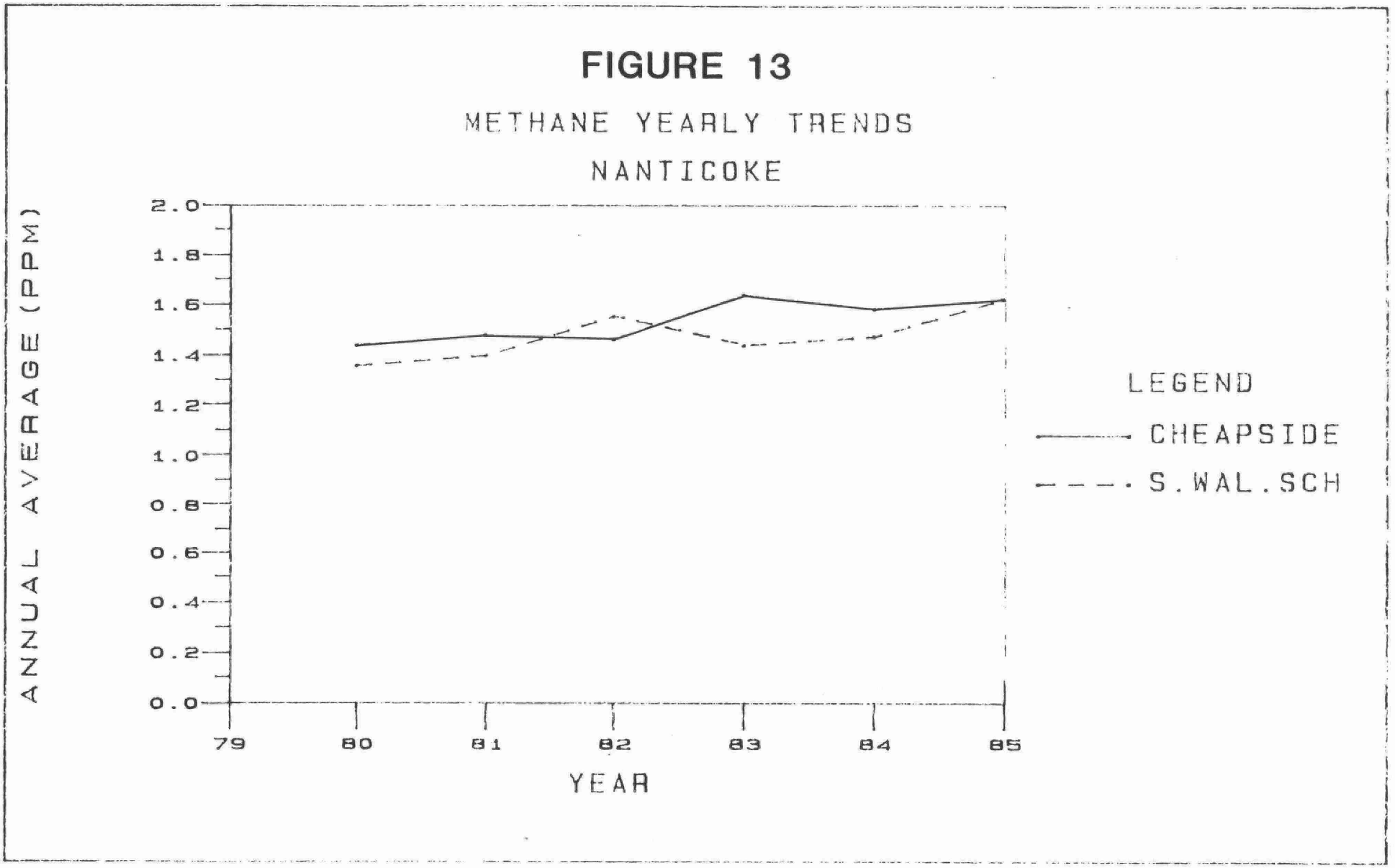

METHANE YEARLY TRENDS
NANTICOKE
ANNUAL AVERAGE (PPM)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
79
80
81
82
83
84
85
YEAR
LEGEND
CHEAPSIDE
S.WAL.SCH

FIGURE 14

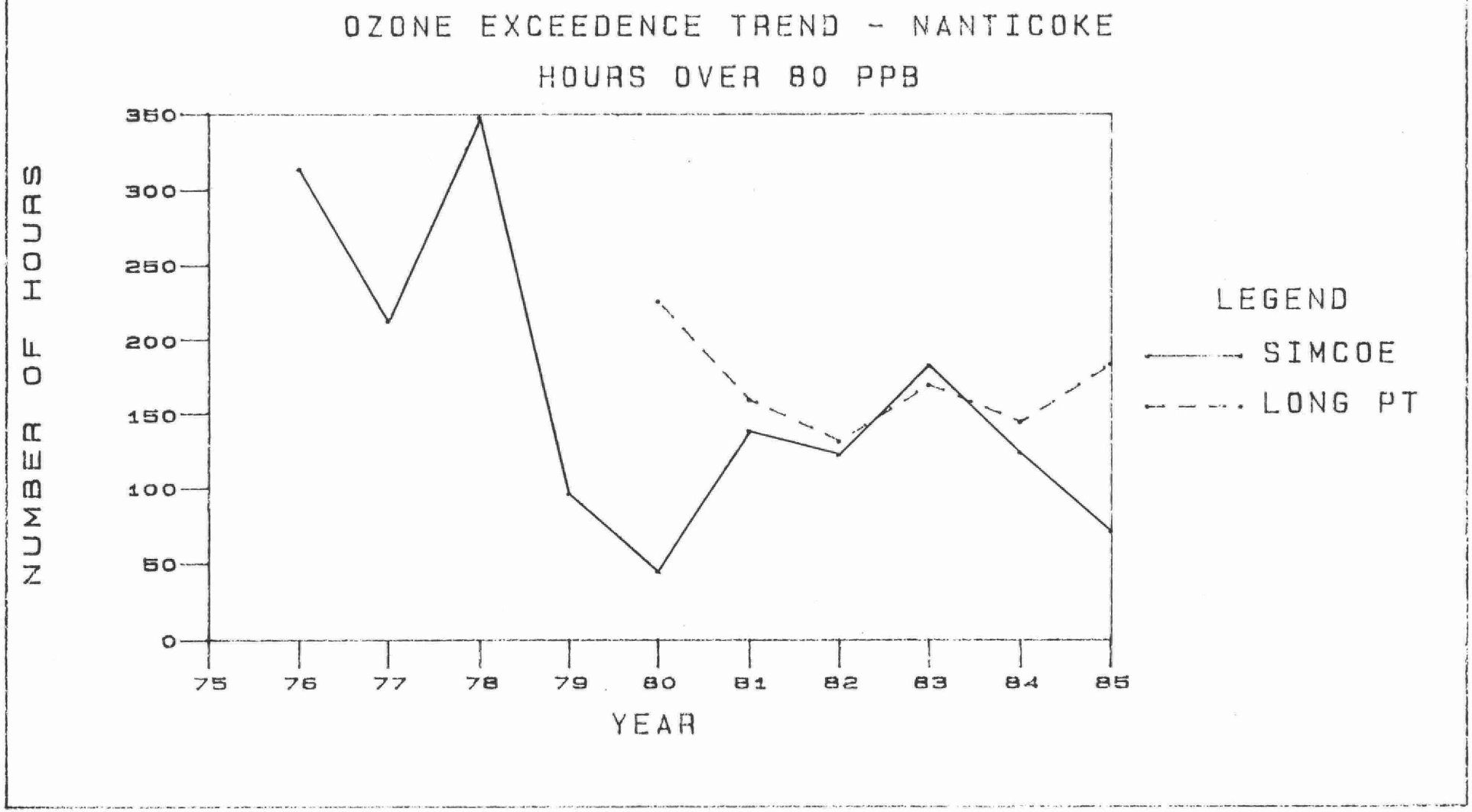
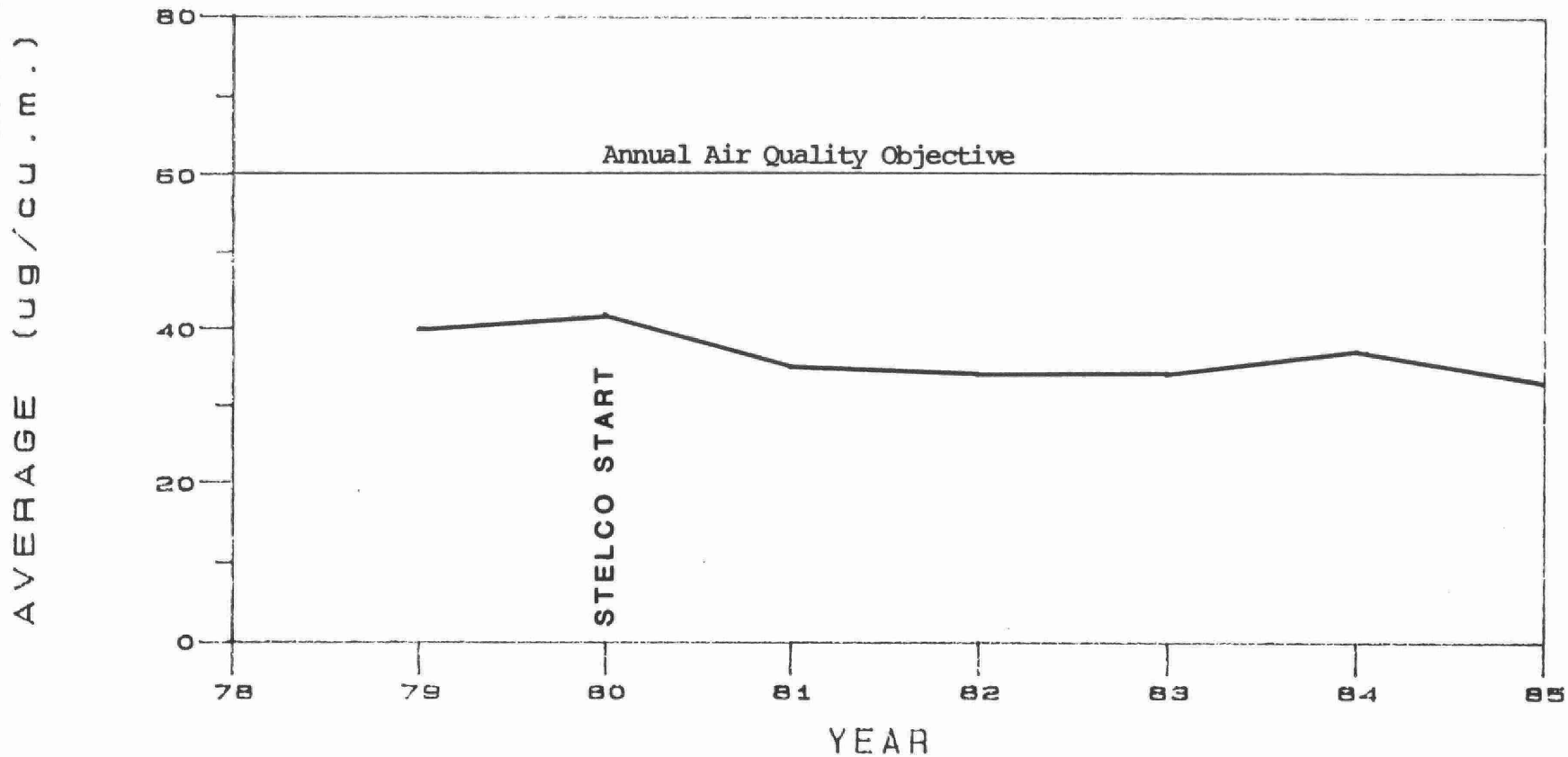

OZONE EXCEEDENCE TREND - NANTICOKE
HOURS OVER 80 PPB
NUMBER OF HOURS
350
300
250
200
150
100
50
0
75
76
77
78
79
80
81
82
83
84
85
YEAR
LEGEND
SIMCOE
LONG PT

FIGURE 15

SUSPENDED PARTICULATE YEARLY TREND

NANTICOKE



AVERAGE OF 7 STATIONS' GEOMETRIC MEANS

FIGURE 16

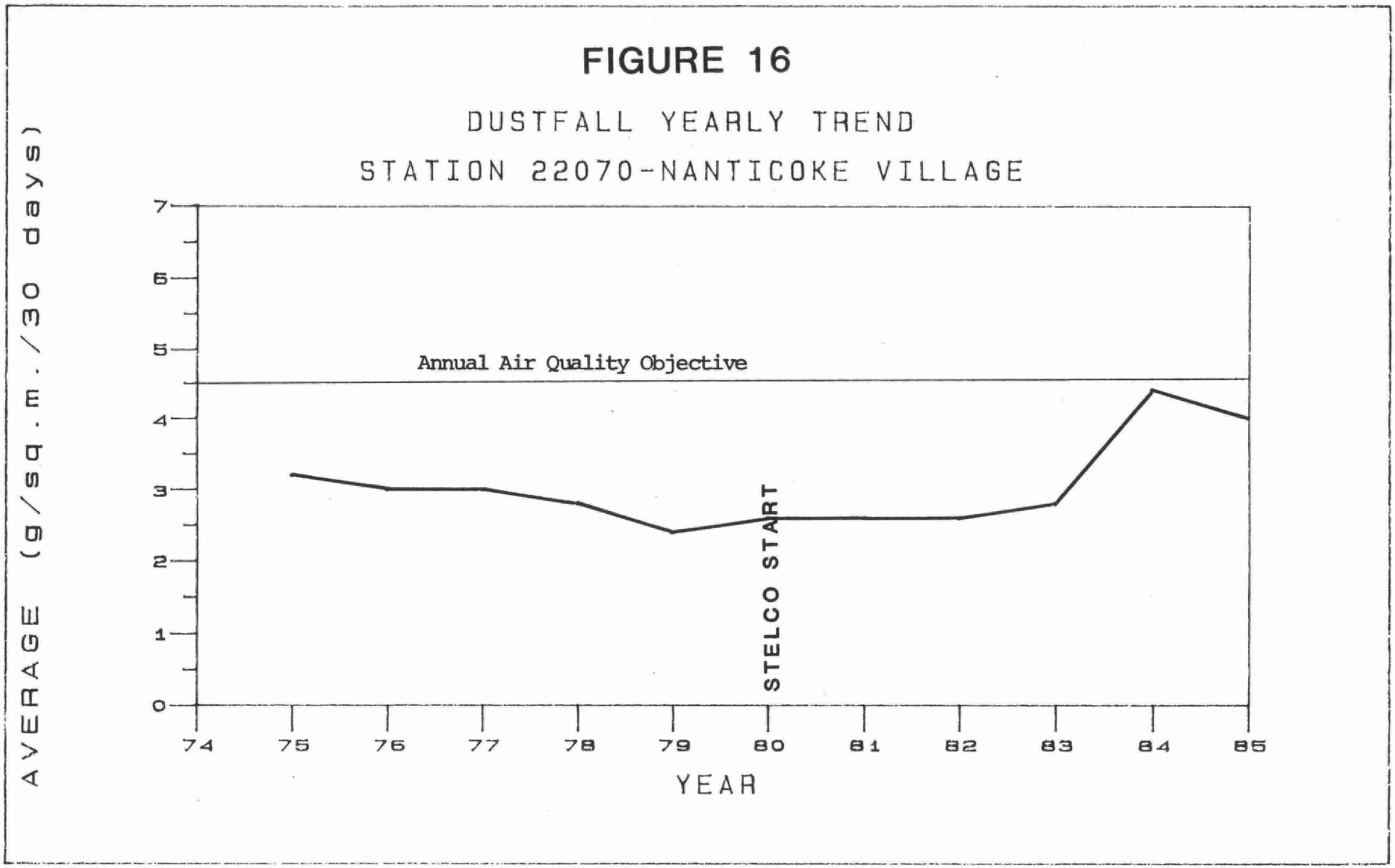

DUSTFALL YEARLY TREND
STATION 22070-NANTICOKE VILLAGE
AVERAGE (g/sq.m./30 days)
Annual Air Quality Objective
STELCO START
0
1
2
3
4
5
6
7
74
75
76
77
78
79
80
81
82
83
84
85
YEAR

FIGURE 17

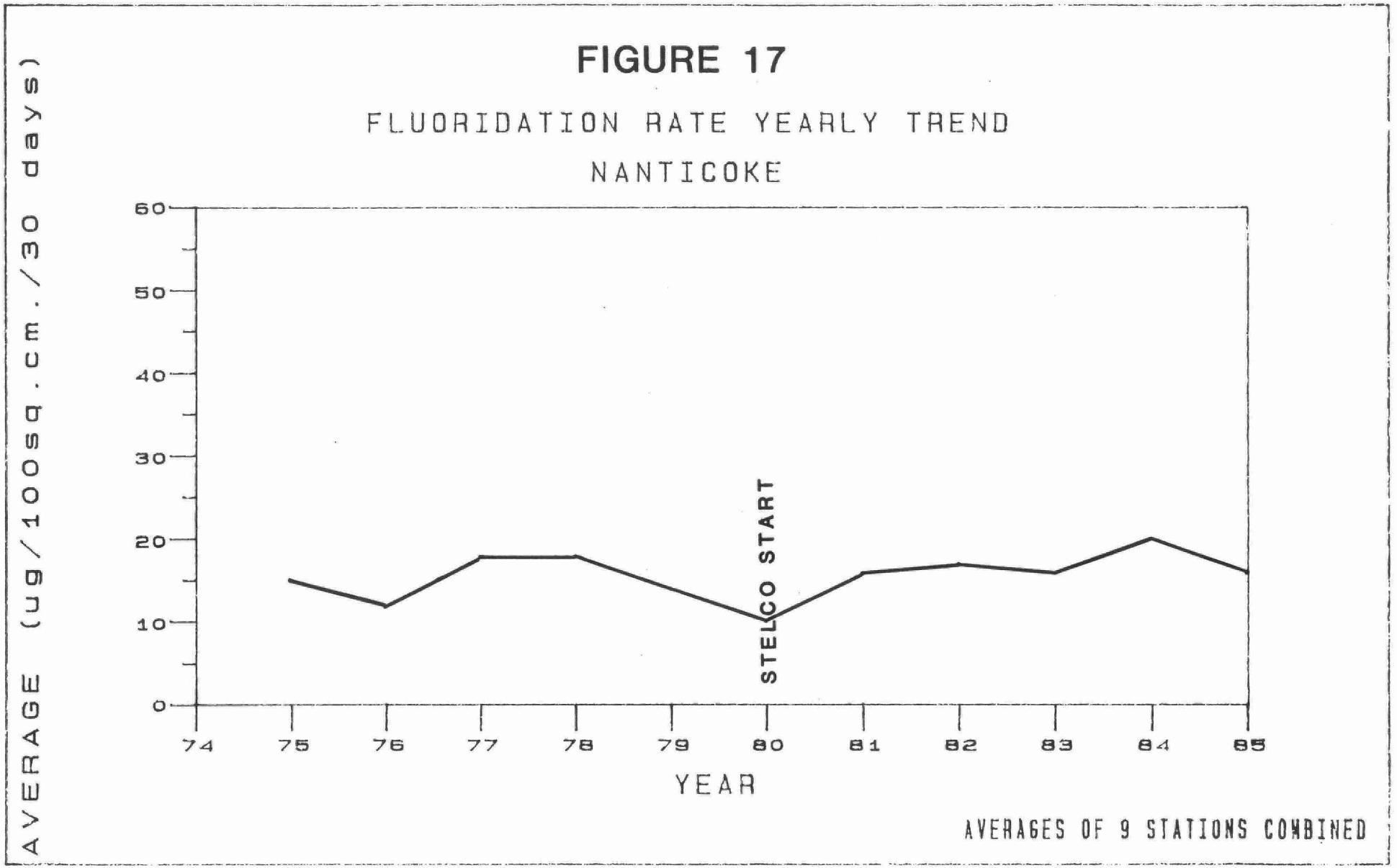

FLUORIDATION RATE YEARLY TREND
NANTICOKE
AVERAGE (ug/100sq.cm./30 days)
60
50
40
30
20
10
0
STELCO START
74
75
76
77
78
79
80
81
82
83
84
85
YEAR
AVERAGES OF 9 STATIONS COMBINED

TABLE 1
MONITORING NETWORK

Map Ref.	Number	Location	SO_2	TSP	CHx	TRS	O_3	NOx	DF	F	Wind/Temp
1	22057	Nanticoke Creek								X	
2	22063	Cayuga								X	
3	22066	Woodlawn Park								X	
4	22070	Nanticoke Village							X		
5	22071	Simcoe	X	X	X		X	X		X	
6	22074	Texaco								X	
7	22075	Sandusk Rd/4th Conc.								X	
8	22078	Rainham Rd/Sandusk								X	
9	22079	Cheapside/2nd Conc.								X	
10	22083	Dogs Nest								X	
11	22086	Cheapside	X	X	X	X		X			
12	22087	Jarvis		X							
13	22090	Port Dover		X							
14	22091	Townsend	X	X							

SO_2 - sulphur dioxide
TSP - total suspended particulate
CHx - hydrocarbons
TRS - total reduced sulphur
O_3 - ozone
NOx - oxides of nitrogen
DF - dustfall
F - fluoride

TABLE 1 (continued)
MONITORING NETWORK

Map Ref.	No.	Location	SO_2	TSP	CHx	TRS	O_3	NOx	DF	F	Wind/Temp
15	22092	Rainham/Sandusk		X					X		
16	22093	N.G.S. Flyash Area							X		
17	22901	Long Point	X				X	X			X
18	22904	S. Walpole School		X	X	X					
19	22907	Nanticoke Village	X	X		X					
20	22952	Peacock Pt. Park		X							
21	22959	Big Creek		X							
22	22960	Dufferin		X							
23	22961	Nanticoke North		X							
24	22964	Stelco North		X							
25	22965	Dogs Nest/Hwy. 6		X							
26	22883	Jarvis Met Tower (Ontario Hydro)									X

SO_2 - sulphur dioxide
TSP - total suspended particulate
CHx - hydrocarbons
TRS - total reduced sulphur
O_3 - ozone
NOx - oxides of nitrogen
DF - dustfall
F - fluoride

TABLE 2
SULPHUR DIOXIDE
UNITS - PARTS PER MILLION

Ontario Objectives: 1-hour - .25
24-hour - .10
1-year - .02

			Annual Average	Maximum 1-hour	Maximum 24-hour	No. of Times Above Objective 1-hour	No. of Times Above Objective 24-hour
22071	Simcoe	1985	.005	.10	.03	0	0
		1984	.004	.20	.04	0	0
		1983	.003	.21	.04	0	0
22086	Cheapside	1985	.003	.19	.03	0	0
		1984	.004	.07	.03	0	0
		1983	.008	.05	.03	0	0
22091	Townsend	1985	.004	.19	.04	0	0
		1984	.003	.35	.05	2	0
22901	Long Point	1985	.002	.12	.02	0	0
		1984	.002	.15	.04	0	0
		1983	.003	.11	.04	0	0
22907	Nanticoke Village	1985	.002	.11	.02	0	0
		1984	.005	.22	.08	0	0

TABLE 3
TOTAL REDUCED SULPHUR
UNITS - PARTS PER BILLION

Ontario Objective: 1-hour -20
(Hydrogen Sulphide)

			Annual Average	Maximum 1-hour	No. of Hours Above Objective
22086	Cheapside	1985	.3	51	2
		1984	.4	14	0
		1983	.5	10	0
22904	South Walpole School	1985	.2	20	0
		1984	.6	106	2
		1983	.1	17	0
22907	Nanticoke Village	1985	1.1	54	17
		1984	1.1	69	11
		1983	1.0	90	5

TABLE 4
NITROGEN DIOXIDE
UNITS - PARTS PER MILLION

Objectives: 1-hour - .20
24-hour - .10

		Annual Average	Maximum 1-hour	Maximum 24-hour	No. of Times Above Objective 1-hour	No. of Times Above Objective 24 hour
22071 Simcoe	1985	.006	.08	.03	0	0
	1984	.009	.13	.04	0	0
	1983	.009	.08	.04	0	0
22086 Cheapside	1985	.003	.05	.03	0	0
	1984	.004	.07	.03	0	0
	1983	.008	.05	.03	0	0
22901 Long Point	1985	.004	.06	.03	0	0
	1984	.003	.04	.03	0	0
	1983	.006	.04	.03	0	0

TABLE 5
NITRIC OXIDE
UNITS - PARTS PER MILLION

		Annual Average	Maximum 1-hour	Maximum 24-hour
22071 Simcoe	1985	.004	.12	.02
	1984	.005	.07	.03
	1983	.002	.08	.03
22086 Cheapside	1985	.001	.07	.02
	1984	.001	.12	.02
	1983	.001	.06	.03
22901 Long Point	1985	.001	.08	.01
	1984	.001	.13	.04
	1983	.001	.08	.02

TABLE 6
NON-METHANE HYDROCARBONS
UNITS - PARTS PER MILLION

			Annual Average	Maximum 1-hour	Maximum 24-hour
22071	Simcoe	1985	.22	0.8	0.4
		1984	.17	2.8	0.3
		1983	.20	0.5	0.4
22086	Cheapside	1985	.07	3.5	0.7
		1984	.15	0.9	0.5
		1983	.27	17.0	1.7
22904	South Walpole School	1985	.06	3.0	0.4
		1984	.19	2.0	0.8
		1983	.40	1.3	1.0

TABLE 7
METHANE
UNITS - PARTS PER MILLION

			Annual Average	Maximum 1-hour	Maximum 24-hour
22086	Cheapside	1985	1.62	3.1	2.0
		1984	1.58	3.6	1.9
		1983	1.64	4.7	2.2
22904	South Walpole School	1985	1.62	2.4	1.9
		1984	1.47	3.8	2.9
		1983	1.44	2.6	2.0

TABLE 8
OZONE
UNITS - PARTS PER MILLION Ontario Objective: 1-hour - .08

		Annual Average	Maximum 1-hour	No. of Hours Above Objective
22071 Simcoe	1985	.031	.118	71
	1984	.029	.115	123
	1983	.030	.123	182
22901 Long Point	1985	.034	.135	183
	1984	.030	.130	144
	1983	.030	.136	169

TABLE 9
SUSPENDED PARTICULATES
UNIT - MICROGRAMS PER CUBIC METRE

Ontario Objectives:-24-hour-120
1-year geometric mean - 60

	Geometric Mean 1983	1984	1985	Maximum 1985	% of Samples Above 120 (1985)
22071 Simcoe	32	36	31	183	4
22086 Cheapside	39	36	32	153	2
22087 Jarvis	46	49	49	203	5
22090 Port Dover	29	39	32	72	0
22091 Townsend	-	36	36	178	2
22092 Rainham/Sandusk	-	-	37	135	3
22904 South Walpole School	33	32	30	163	3
22907 Nanticoke Village	-	58	59	231	10
22952 Peacock Pt. Park	28	32	26	69	0
22959 Big Creek	32	30	33	125	2
22960 Dufferin	38	41	34	72	0
22961 Nanticoke North	40	40	45	207	7
22964 Stelco North	34	38	39	188	2
22965 Dogs Nest/Hwy 6	28	39	33	120	0

TABLE 10
DUSTFALL
UNITS - GRAMS/ SQ. METRE/30 DAYS

Ontario Objectives 1 month-7.0
1 year avg 4.5

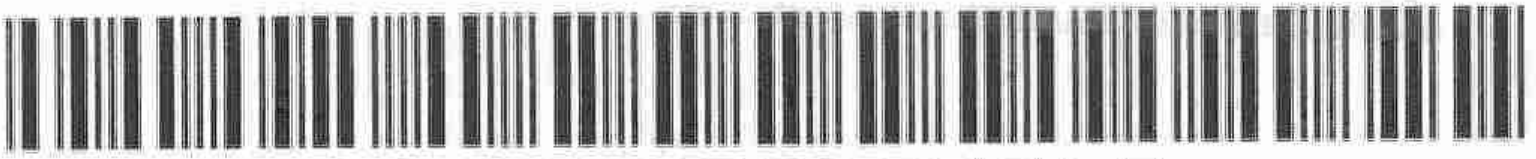
	Annual Average 1983	1984	1985	1985 1-Month Maximum	No. of Months Above Objective 1983	1984	1985
22070 Nanticoke Village	2.8^{11}	4.4^{11}	3.8^{11}	6.9	0	1	0
22092 Rainham/Sandusk	-	-	2.7^{9}	4.6	-	-	0
22093 N.G.S. Flyash Area	-	-	3.7^{7}	8.3	-	-	1

Exponents refer to number of months when less than 12 valid samples.

TABLE 11
FLUORIDATION RATE
UNITS - MICROGRAMS F/100 SQ. CM/30 DAYS

Ontario Objectives: Apr.15 to Oct. 15 - 40
Oct.16 to Apr. 14 - 80

		Annual Average			1985 1-Month	Number of Months Above Objective		
		1983	1984	1985	Maximum	1983	1984	1985
22057	Nanticoke Creek	19	23	24	44	0	0	0
22063	Cayuga	14	16	13	23	0	0	0
22066	Woodlawn Park	15	20	15	24	0	0	0
22071	Simcoe	13	17	10	19	0	0	0
22074	Texaco	16	23	18	32	0	0	0
22075	Sandusk/ 4th Conc.	14	18	13	19	0	0	0
22078	Rainham/ Sandusk	19	23	19	34	0	0	0
22079	Cheapside/ 2nd Conc.	19	21	15	23	0	0	0
22083	Dogs Nest	16	17	15	46	0	0	0


9693600000926 7